KEYNOTE SPEAKER

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Quantum Disruption

Quantum Technologies are coming of age. The EU has recently aproved a FET-Flagship on Quantum Technologies, an instrument that will invest 1000 M Euros structured around four pillars: quantum computation, quantum communication, quantum simulation and quantum sensors. In this talk, we shall concentrate in recent progress achieved in quantum computation. The basic idea emerges from the fact that quantum mechanics allows for the manipulation of information in superposition states, called qubits. Furthermore, these superpositions evolved simultaneously following logical gates, providing a genuine parallel computation paradigm. A relevant example of the future use of a quantum computer is illustrated by Shor's algorithm, a quantum circuit that will factor large numbers in polynomial time, and will consequently break all present cryptography. Quantum logic, though, does not correlate in a simple way to classical algorithms. Non-trivial efforts must be devoted to further understand which problems can be addressed efficiently with quantum computation. Finally, it is arguable that quantum computation brings not only a possible dramatic speed up in some computations, but also provides relevant savings in energy. Research teams around the world compete fiercely to get a first demonstration of quantum supremacy over classical computation. Welcome to the quantum race.

José Ignacio Latorre is a Full Professor at the Universitat de Barcelona and is the leader of the Quantic group at Barcelona Supercomputing Center. He got his Ph. D. in Elementary Particle Physics at the Universitat def Barcelona on Elementary Particle Physics, was a Fulbright Fellow at MIT, a postdoc at the Niels Bohr Institute in Denmark, and a Long-term visiting professor at Center for Quantum Technologies in Singapore. He is the founder and director of the Centro de Ciencias de Benasque Pedro Pascual. He has worked as consultant for companies on artificial intelligence. He is a founder of Entanglement Partners. He wrote two popular books: "La Nada" and "Cuántica". He produces wine!